INFO SHEET
Veterinary Services

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Management Practices Associated with High-Producing U.S. Dairy Herds

Results of a National Animal Health Monitoring System (NAHMS) 1996 study identified management practices used on high-producing U.S. dairy herds. The greatest difference between high and low production herds was in record keeping. High producing herds were more likely to use Dairy Herd Improvement Association records or have their own on-farm computer system than low production herds.

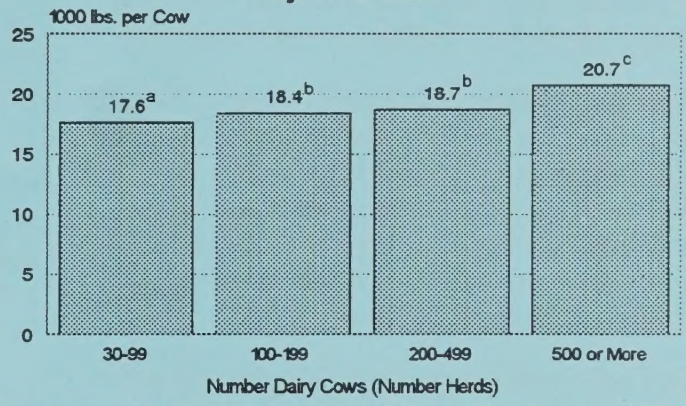
The NAHMS Dairy '96 study assessed dairy cow health and productivity in 20 states[1] that represented 83.1 percent of U.S. milk cows. Over 2,500 producers participated in this USDA project. For this analysis, only herds with 100 percent Holstein cows were compared.

Herds were divided into four size categories: 30-99 cows, 100-199 cows, 200-499 cows, and 500 or more cows. Within each size category, herds were ranked by milk production per cow. For each size category, the top 25 percent of herds (top or highest quartile) based on milk production were compared to the bottom 25 percent of herds (bottom or lowest quartile) by management practices used. Across all size categories, there were 446 herds in the top quartile and 460 herds in the bottom quartile (Table 1).

As herd size increased, so did average milk production per cow. On average, herds with 30 to 99 cows produced less than 18,000 pounds per cow while herds with 500 or more cows had produced more than 20,000 pounds per cow (Figure 1).

Figure 1

Rolling Herd Average (RHA) Milk Production by Herd Size



a, b, c - Means with different letters are statistically different at the .01 level. #3247

Management Practices

More top quartile producers used Dairy Herd Improvement Association (DHIA) records than those in the bottom quartile. On-farm computers were also more often associated with high milk production herds. Use of on-farm computer record-keeping systems was lowest among small producers and increased with herd size.

Comparison of DHIA and on-farm computer use showed that on-farm computers complemented use of DHIA records as at least three-quarters of the top quartile producers used DHIA even if they had on-farm computers.

Top producers were more likely to have particpated in the Milk and Dairy Beef Quality Assurance Program (MDBQA). Participation in MDBQA also increased with herd size.

Feeds and Feeding

Top producers were more likely to have fed a total mixed ration (TMR) to their cows than low producers. For herds of 100 or more cows, at least 80 percent of top producers

1 Participating states: California, Florida, Idaho, Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, New Mexico, New York, Ohio, Oregon, Pennsylvania, Tennessee, Texas, Vermont, Washington, and Wisconsin.

Top producer/high production: top quartile based on per cow production.
Bottom producer/low production: bottom quartile based on per cow production.

fed a total mixed ration, while just 48 percent of high producers of 99 or fewer cows fed a TMR (Figure 2). One limiting factor in the use of TMRs among producers with small herds was the use of tie stalls or stanchion barns to house lactating cows. High producers with 30 to 99 cows who used tie stalls or stanchion barns fed a TMR 43 percent of the time, while those with other housing types fed a TMR 60 percent of the time.

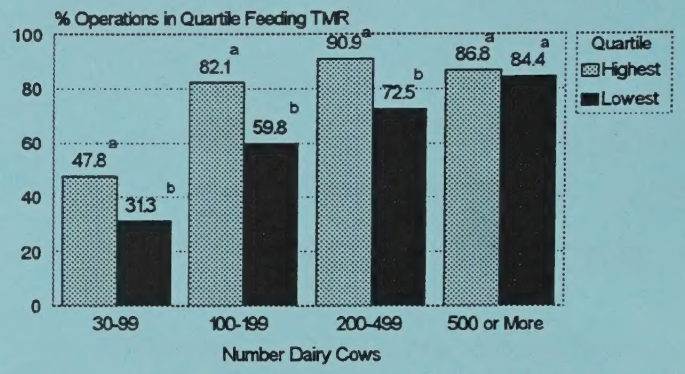
Over 90 percent of top producers across all herd sizes used forage test results in balancing feed rations.

There was no significant difference between top and bottom producers in roughages fed that were raised on farm. Producers who used pastures were more likely to be in the lowest quartile of milk production per cow than in the top quartile. (This result does not imply pasture use is associated with lower net farm income as costs were not included in this analysis.)

Producers with smaller herds grow their own grains for feeding cows more often than producers with larger herds. This study showed that producers with fewer than 200 cows who grew their own grains were more likely to be in the top production quartile. Producers of the largest herds who grew grains were more likely to be in the lowest quartile. This finding suggests that in large herds crop production competes with the dairy for management resources, while in small herds top producers have "excess" management which can be applied to crop production.

Figure 2

RHA Milk Production Quartiles of Operations Feeding Total Mixed Rations (TMR) by Herd Size



a, b - within a herd size category, different letters were statistically different at the .01 level. #3248

staglandins increased with herd size. Additional analysis showed that producers who used systematic prostaglandins tended to use them on selected cows rather than the majority of the herd.

Profitable dairy herd management includes knowing when to cull cows. Producers in the top quartile were more likely to cull healthy cows using a break-even milk production level than those in the bottom quartile. The proportion of high producers using break-even milk production level for culling decisions increased from a low of one-third for herds with fewer than 100 cows to over four-fifths of herds with more than 500 cows.

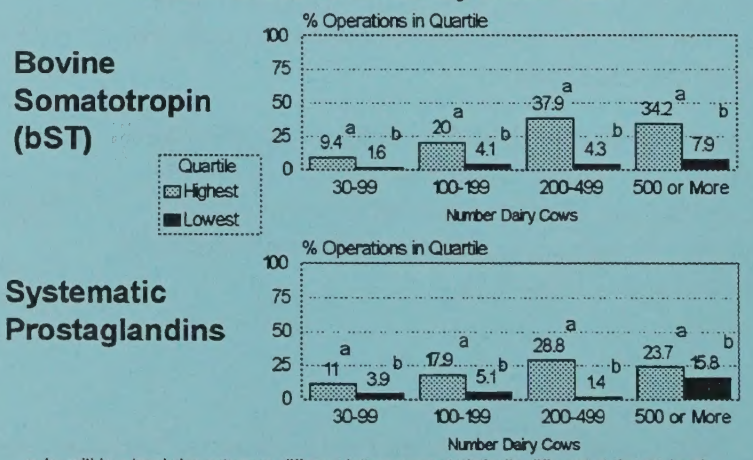
Cow Management

Use of bovine somatotropin (bST) was strongly associated with high milk production per cow (Figure 3). As herd size increased, the percentage of high-production producers using bST increased. As herd size increased, the proportion of cows being treated with bST increased as well. Based on additional analyses, producers with fewer than 200 cows who used bST were more likely to use it on selected cows than the majority of the herd. Beyond the 200-cow herd size, producers who used bST were more inclined to use it on the majority of their cows.

Use of systematic prostaglandins for estrus synchronization followed a pattern similar to use of bST. More high production producers used systematic prostaglandins than producers with low production levels, and the percentage of producers using systematic pro-

Figure 3

RHA Milk Production Quartiles of Operations Using bST & Systematic Prostaglandins to 50 - 100% of Cows by Herd Size



a, b - within a herd size category, different letters were statistically different at the .01 level. #3249

Table 1: Relationships between management practices and milk production by herd size.

	Herd Size							
	30-99 Cows		100-199 Cows		200-499 Cows		500 or More Cows	
	High	Low	High	Low	High	Low	High	Low
Pounds per cow+	19,600	15,750	20,450	16,714	21,200	16,500	22,390	18,668
Number of herds^	247	256	95	97	66	69	38	38
	Percent of Producers							
Records								
DHIA	81.4	21.5*	79.0	21.7*	81.8	29.0*	73.7	47.4*
On-farm computer	20.2	5.9*	32.6	14.4*	57.6	27.5*	92.1	55.3*
Milk and Dairy Beef Quality Assurance Program (MDBQA)	16.6	7.4*	29.5	7.2*	22.7	11.6	29.0	21.0
Total mixed ration	47.8	31.3*	82.1	59.8*	90.9	72.5*	86.8	84.4
Test forage for ration balancing	91.9	55.1*	97.9	69.1*	95.6	66.7*	92.1	86.8
Pasture cows	46.6	69.9*	16.8	48.5*	15.2	42.0*	2.6	21.1*
Raise feeds (≥50% feed fed)								
Forage	97.2	96.1	96.1	98.0	75.8	63.8	57.9	55.3
Feed grains	68.4	59.4*	66.3	47.4*	47.0	33.3	5.3	23.7*
50-100% of cows administered:								
Bovine somatotropin (bST)	9.4	1.6*	20.0	4.1*	37.9	4.3*	34.2	7.9*
Systematic prostaglandins	11.0	3.9*	17.9	5.1*	28.8	1.4*	23.7	15.8*
Use break-even milk level to determine culling	35.2	21.9*	46.3	32.0*	62.1	37.7*	81.6	57.9*
Separation of calves/ mothers								
Immediately, no nursing	54.2	45.3*	56.8	34.0*	43.9	31.9*	55.3	23.7*
After nursing, but <12 hours	22.3	18.0*	21.1	20.6*	40.9	15.9*	31.6	36.8*
After nursing, within 12-24 hrs	16.6	16.8*	16.8	15.5*	15.2	27.5*	10.5	31.6*
After nursing, but >24 hours	6.9	19.9*	5.3	29.9*	0.0	24.7*	2.6	7.9*
Colostrum feeding								
Nurse only	21.5	43.0*	24.2	57.7*	22.7	59.4*	15.8	42.1*
Hand-fed: bucket or bottle	72.5	55.8*	67.4	39.2*	59.1	33.3*	57.9	36.8*
Hand-fed: esophageal feeder	6.0	1.2*	8.4	3.1*	18.2	7.3*	26.3	21.1*
Quantity of colostrum fed								
4 or more quarts	35.2	14.8*	40.0	11.3*	39.4	8.7*	42.1	18.4*
2 - 4 quarts	32.0	25.4*	27.4	26.7*	27.3	18.9*	31.6	13.2*
Less than 2 quarts	11.3	16.8*	8.4	8.3*	10.6	13.0*	10.5	26.3*
Nurse only	21.5	43.0*	24.2	57.7*	22.7	59.4*	15.8	42.1*
Dairy heifers contract raised	8.9	1.6*	5.3	4.1	15.2	5.8	21.1	41.1
Services provided by a veterinarian								
Animal diagnosis & treatment	95.6	91.0*	95.8	97.9	98.5	91.3	97.4	92.1
Provide drugs or vaccines	94.3	82.8*	92.6	90.7	92.4	82.6	92.1	86.8
Vaccination consultation	89.5	69.5*	91.6	72.2*	92.4	84.1	97.4	81.6*
Reproductive consultation	90.2	67.2*	89.5	75.3*	89.4	76.8	94.7	81.6
Herd diagnostics	58.7	45.7*	72.6	59.8	75.8	62.3	81.6	79.0

+ Values for high herds are minimum production per cow. Values for low herds are maximum production per cow.
* Difference between high and low percentile producers is statistically significant at the .05 level.
^ Top and bottom quartiles differed in number of herds due to a number of herds falling at the cut point.

Relationships (continued).								
	Herd Size							
	30-99 Cows		100-199 Cows		200-499 Cows		500 or More Cows	
	High	Low	High	Low	High	Low	High	Low
Pounds per cow+	19,600	15,750	20,450	16,714	21,200	16,500	22,390	18,668
Number of herds^	247	256	95	97	66	69	38	38
	Percent of Producers							
Vaccinations, cows								
BVD	90.3	57.0*	91.6	76.3*	95.5	75.4*	89.5	86.8
IBR	88.3	56.3*	87.4	74.2*	93.9	76.8*	76.3	89.5
PI3	82.2	49.2*	81.1	69.0	77.3	69.6	71.1	76.3
BRSV	79.4	48.1*	76.8	61.9*	84.9	65.2*	63.2	79.0
H. somnus	53.4	25.0*	55.8	37.1*	59.1	43.5	42.1	60.5
Leptospirosis	83.8	60.9*	86.3	74.2*	92.4	78.3*	89.5	94.7
Salmonella	19.0	14.1	26.3	18.6	33.3	39.1	42.1	57.9
E. coli mastitis	28.3	19.5*	54.7	35.1*	60.6	46.4	76.3	68.4
Clostridia	83.8	60.9*	86.3	74.2*	92.4	78.3*	89.5	94.7
Brucellosis (heifers)	18.6	13.7	26.3	20.6	33.3	34.8	39.5	47.4
Johne's disease (heifers)	14.2	13.7	33.7	26.8	39.4	33.3	44.7	50.0
Preventive practices								
Deworming cows	57.9	50.8	42.1	68.0*	43.9	53.6	15.8	44.7*
Vitamins A-D-E, cows (injections or feed)	91.5	77.7*	94.7	75.3*	84.9	68.1*	92.1	76.3
Probiotics, cows & heifers	15.4	7.8*	16.8	10.3	19.7	10.1	26.3	29.0
Selenium (injection or feed), lactating cows	90.3	60.2*	87.4	60.8*	80.3	50.7*	68.4	63.2
Coccidiostats in feed, heifers	70.5	28.9*	76.8	43.3*	66.7	36.2*	57.9	57.9
Ionophores, heifers	70.5	22.7*	67.4	45.4*	66.7	26.1*	60.5	50.0
Cattle brought onto operation	38.5	34.4	46.3	46.4	51.5	62.3	50.0	79.0*
Of operations that brought cattle onto their premises								
Number of operations	95	88	44	45	34	43	19	30
Quarantine all arrivals	9.5	4.6	11.4	15.6	20.6	23.3	21.1	23.3
Require cattle vaccination before bringing onto operation								
Brucellosis	60.0	47.7	52.3	64.4	52.9	76.7*	73.7	80.0
BVD	51.6	43.3	54.6	57.8	64.7	53.5	68.4	60.0
IBR	51.6	33.3*	54.6	57.8	64.7	76.7	73.7	80.0
Leptospirosis	53.7	38.6	54.6	55.6	64.7	51.2	73.7	53.3
Test cattle before bringing onto operation								
Brucellosis	24.2	33.3*	34.1	60.0*	20.6	51.2*	63.2	56.7
Johne's disease	5.3	8.0	15.9	13.3	2.9	4.7	10.5	10.0
BVD	13.7	15.9	15.9	28.9	11.8	21.4	21.1	16.7
TB	23.2	19.3	29.6	37.8	17.7	21.4	36.8	33.3
Test dairy cows before bringing onto operation								
Somatic cell count	28.0	20.0	70.0	23.8*	33.3	19.1	28.6	55.6
Milk culture	8.0	10.0	20.0	4.8	25.0	19.1	28.6	44.4

+ Values for high herds are minimum production per cow. Values for low herds are maximum production per cow.
* Difference between high and low percentile producers is statistically significant at the .05 level.
^ Top and bottom quartiles differed in number of herds due to a number of herds falling at the cut point.

Calf Management

Neonatal calf care differed between top and bottom quartile producers. Top producers were more likely to separate their calves from the dam at birth before nursing, feed colostrum by either bucket or esophageal feeder, and feed four or more quarts of colostrum than bottom producers. Of the two hand colostrum feeding methods, bucket feeding was more popular than esophageal feeding. As herd size increased, bucket feeding declined while esophageal feeding increased. Among those producers who allowed their calves to nurse, top producers were more likely to supplement colostrum delivery with hand feeding.

A minority of producers practiced contract heifer raising (had others raise their calves). As herd size increased, the percentage of producers who relied on others to raise their heifers also increased.

Veterinary Services

Producers in the top quartile used services of veterinarians more often than those in the bottom quartile. Number of veterinary visits per cow declined as herd sizes increased. High milk production operations with 30 to 99 cows had .44 visits[1] per cow, while high operations with 500 or more cows had only .08 visits per cow (Figure 4).

The top five veterinary services requested by dairy producers, in order of importance, were individual animal diagnosis, providing drugs and vaccines, vaccination consultation, reproductive consultation, and assistance in managing herd health through whole herd diagnostic services. While top producers were more likely to use such services than bottom producers, the differences were significant primarily at the smallest herd size. Assistance in herd health management through whole herd diagnostics was most related to herd size as larger producers were more likely to request this service than smaller producers.

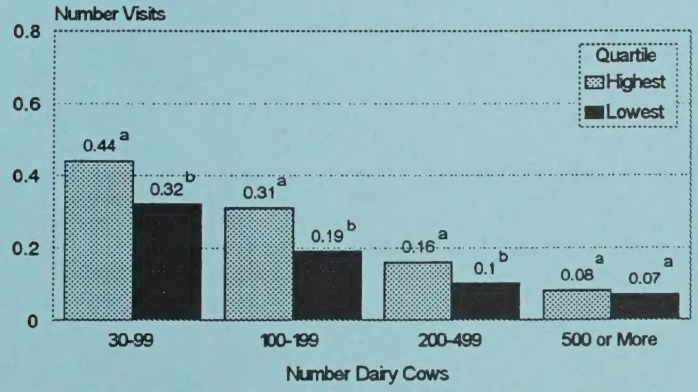
Preventive Practices

The NAHMS producers were asked about vaccination against 11 diseases in heifers and 9 in cows. Producers in the high milk production quartile vaccinated against more diseases than those in the bottom quartile. High quartile producers with 30 to 99 cows vaccinated against an average of 6.1 diseases in heifers within the previous 12 months, while low quartile producers vaccinated against an average 3.8 diseases (Figure 5). Vaccination against disease increased as herd size increased, especially among low quartile producers, so that at 500 or more cows, there was no statistical difference in vaccine use between the high and low quartile operations.

Deworming cows was generally practiced less on high production operations with the exception of high production herds with 30 to 99 cows which were more likely to deworm than low production herds. Producers with 30 to 99 cows dewormed their cows the most, while producers with over 500 cows dewormed the least.

Figure 4

Average Number of Veterinary Visits per Year Per Cow by Milk Production Quartile and Herd Size

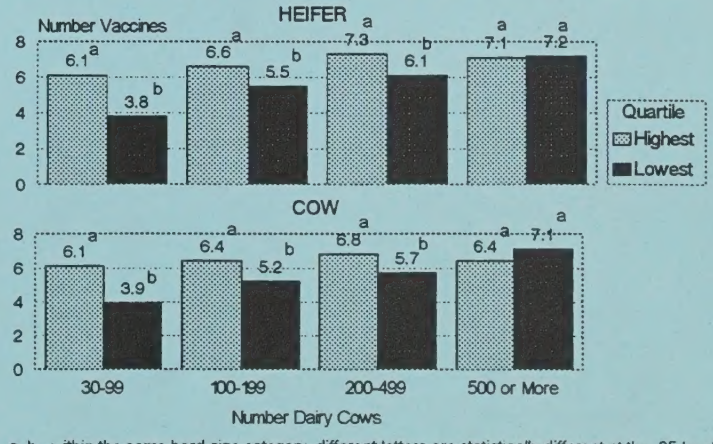


a, b - within the same herd size category, different letters are statistically different at the .05 level.

#3250

Figure 5

Average Annual Number of Vaccines Given per Heifer & Cow by Milk Production Quartile & Herd Size



a, b - within the same herd size category, different letters are statistically different at the .05 level.

#3251

1 Veterinary visits were defined as sum of the number of days an employed veterinarian was on the operation, the number of visits by a private veterinarian, and the number of times dairy animals were transported to a private veterinarian.

Top producer/high production: top quartile based on per cow production.
Bottom producer/low production: bottom quartile based on per cow production.

Though probiotic use was not a common practice (less than 20 percent of all producers in the high category), their use did increase as herd size increased. Use of probiotics was significantly related to high milk production only for herds of 30 to 99 cows.

More producers in the high production category supplimented heifers or cows with selenium by either injection or in feed than low production producers. Over four-fifths of high producers with fewer than 500 cows supplimented their animals with selenium, while the percentage dropped to two-thirds for producers with 500 or more cows.

At least three-fifths of producers in the high quartile fed ionophores to their heifers, while one-half or fewer of the low quartile producers fed ionophores.

Biosecurity

As herd size increased, so did the proportion of producers who brought cattle onto their operations. There were no significant differences between the top and bottom quartiles in percentage of operations with new cattle arrivals, except for the largest size herds. For herds with 500 or more cows, producers in the bottom quartile were more likely to bring cattle onto their operations than top quartile producers.

The primary biosecurity measure[1] used by producers who brought cattle onto the operation was pre-entry vaccinations. Over one-half of producers who had new cattle arrivals reported they required cattle to be vaccinated for brucellosis, Johne's disease, bovine viral diarrhea (BVD), infectious bovine rhinotracheitis (IBR), and leptospirosis before adding them to their herds. There were few differences in vaccination requirements between the high and low producers, except for the smallest herd size. Bottom quartile producers with fewer than 100 cows were less likely to vaccinate than their top quartile counterparts.

Testing for diseases prior to bringing cattle onto the operation is another means of protecting one's herd health. Generally, pre-entry disease testing was less popular than pre-entry vaccinations, and the disease tested for most often was brucellosis. Other than brucellosis, there were no significant differences between top and bottom quartiles in pre-entry testing.

Of biosecurity measures, producers used quarantine the least. Less than 10 percent of producers with fewer than 100 cows physically separated new arrivals from other cattle on the operation. Over 20 percent of producers with 200 or more cows quarantined in-coming cattle. Once again, there was little difference between top and bottom quartiles.

Conclusions

Producers in the top milk production per cow quartile were more likely to engage in a variety of management activities designed to improve milk production or maintain animal health than those in the bottom quartiles. Such management practices started with record keeping where producers in the top quartile were more likely to have DHIA or on-farm computers for record keeping that allow them to make better informed decisions. Good records can help producers evaluate the effectiveness of management practices, such as use of bST and systematic prostaglandins which were used by more producers in the top quartile.

Top quartile producers engaged in more practices designed to improve herd health. They used veterinarians more often as herd health consultants. They practiced more progressive neonatal calf care than bottom quartile producers to ensure newborn calves received adequate colostrum. For heifers and cows, top producers made greater use of vaccines than bottom producers. Biosecurity was a weakness for both top and bottom producers. Few tested new arrivals for common health problems or quarantined new arrivals, but the majority had their new arrivals vaccinated before allowing them onto the operation.

NAHMS collaborators on the Dairy '96 study included the National Agricultural Statistics Service (USDA); State and Federal Veterinary Medical Officers and Animal Health Technicians; and the National Veterinary Services Laboratories (USDA:APHIS:VS). For more information, contact:

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1 Activity designed to minimize disease transfer from purchased livestock.